



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/907,363	07/17/2001	Bo Su Chen	M40 01375-02 US	6468
128	7590	01/15/2004	EXAMINER	
HONEYWELL INTERNATIONAL INC.			FUREMAN, JARED	
101 COLUMBIA ROAD			ART UNIT	PAPER NUMBER
P O BOX 2245				2876
MORRISTOWN, NJ 07962-2245				

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/907,363	CHEN, BO SU
Examiner	Art Unit	
Jared J. Fureman	2876	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on 20 October 2003.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 1,3-13,15-19 and 21-32 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) 17-19 and 21-32 is/are allowed.

6) Claim(s) 1,3-13,15 and 16 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 17 July 2001 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) The translation of the foreign language provisional application has been received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_

4) Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_

## **DETAILED ACTION**

Receipt is acknowledged of the amendment, filed on 10/20/2003, which has been entered in the file. Claims 1, 3-13, 15-19, and 21-32 are pending.

### ***Specification***

1. The abstract of the disclosure is objected to because the abstract is greater than 150 words. Correction is required. See MPEP § 608.01(b).

### ***Claim Objections***

2. Claims 11 and 15 are objected to because of the following informalities:

Re claim 11, line 8: "said rotating member" lacks proper antecedent basis. Since line 2 recites two rotating members, it is unclear as to which rotating member is being referred to, or whether both rotating members are being referred to.

Re claim 15, line 1: "said light source" lacks proper antecedent basis.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-13, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burke, Jr (US 3,688,570, previously cited) in view of Cui et al (US 6,399,940 B1, previously cited).

Re claims 1 and 3-10: Burke, Jr teaches a method for analyzing the performance of a mechanical system, comprising the steps of: directing light from at least one light source (32) to encoded portions (grids  $G_1$  and  $G_2$ ) of two rotating members (shells 14 and 22, respectively) associated with said mechanical system; reflecting a portion of said light to at least one encoded portion of said rotating members; detecting (via photodetectors 48 and 53) a reflected portion of said light; and recovering information from said reflected portion of said light, wherein said reflected portion of said light contains performance characteristic (torque, for example) data of said mechanical system; wherein said at least one encoded portion of said rotating members comprises two identical bar codes (the grids  $G_1$  and  $G_2$  have lines and spaces, and thus, can be considered a bar code); wherein said at least one encoded portion of said rotating members comprises a measuring feature formed along circumferential edges of said rotating members (the grids  $G_1$  and  $G_2$  are a measuring feature); wherein said measuring feature formed along circumferential edges of said rotating members comprises at least one optical encoder (the grids  $G_1$  and  $G_2$  are an optical encoder) for encoding performance characteristic data of said mechanical system; configuring at least one measuring feature to form a plurality of measuring features comprising a vernier (the grids  $G_1$  and  $G_2$  include a plurality of grid lines, thus, comprising a vernier) for measuring movement within said mechanical system; shaping said at least one encoded portion of said rotating member to increase reflection of said reflected light in a particular direction (the grids  $G_1$  and  $G_2$  include reflective portions); reflecting light beams from at least one encoded portion (grid  $G_1$ , for example) of said rotating

members to interact with at least one other encoded portion of said rotating members (grid G<sub>2</sub>, for example) to form Moiré fringes on a sensor plate (photodetectors 48 and 53); assessing the reliability of said mechanical system utilizing said performance characteristic data of said mechanical system; generating an electrical feedback signal (the photodetectors 48 and 53 generate an electrical signals) from recovered information containing said performance characteristic data of said mechanical system; and providing said electrical feedback signal to an input (signal processing circuitry 49) of said mechanical system, thereby improving said performance characteristic data of said mechanical system (see figures 1A, 1, 2, 4, column 1 lines 4-6, 59-67, and column 2 line 56 - column 5 line 64).

Burke, Jr fails to specifically teach the light source comprising a vertical cavity surface-emitting laser.

Cui et al teaches a method and apparatus for measuring the performance of a system, including the use of a vertical cavity surface-emitting laser (254) (see figure 6 and column 7 lines 31-37).

In view of Cui et al's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the method and apparatus as taught by Burke, Jr, the light source comprising a vertical cavity surface-emitting laser, in order to provide a compact laser diode for the light source, thereby reducing the size of the apparatus.

Re claims 11-13, and 16: The teachings of Burke, Jr have been discussed above. Burke, Jr also teaches an apparatus for analyzing the performance of a

mechanical system having two rotating members (shells 14 and 22) therein, said apparatus comprising: directing mechanism for directing light from a light source (32) in order to intercept an encoded portion (grids G<sub>1</sub> and G<sub>2</sub>) of said rotating member; reflecting mechanism for reflecting a portion of said light from said encoded portion of said rotating member (the grids G<sub>1</sub> and G<sub>2</sub> include reflective portions); and detecting mechanism (photodetectors 48 and 53) for detecting a reflected portion of said light to recover performance data maintained therein, wherein said performance data contains performance characteristics (torque, for example) of said mechanical system; recovery mechanism (signal processing circuitry) for recovering said performance data; reflecting mechanism for reflecting a portion of said light through said encoded portion of said rotating member; wherein said encoded portion of said rotating member comprises a bar code (the grids G<sub>1</sub> and G<sub>2</sub> have lines and spaces, and thus, can be considered a bar code) (see figures 1A, 1, 2, 4, column 1 lines 4-6, 59-67, and column 2 line 56 - column 5 line 64).

Burke, Jr fails to specifically teach the light source comprising a vertical cavity surface-emitting laser.

The teachings of Cui et al have been discussed above.

In view of Cui et al's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the apparatus as taught by Burke, Jr, the light source comprising a vertical cavity surface-emitting laser, in order to provide a compact laser diode for the light source, thereby reducing the size of the apparatus.

5. Claims 11-13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bechtel et al (US 5,001,937, cited by applicant's) in view of Cui et al.

Bechtel et al teaches an apparatus for analyzing the performance of a mechanical system having two rotating members (bands 2 and 3) therein, said apparatus comprising: directing mechanism for directing light from two light sources (laser 18, provided in each of sensors 4 and 5, thus two lasers are present) in order to intercept an encoded portion (portions of different reflectivity in bands 2 and 3) of said rotating members; reflecting mechanism (the bands 2 and 3 include reflective portions) for reflecting a portion of said light from said encoded portion of said rotating member; and detecting mechanism (detector 26) for detecting a reflected portion of said light to recover performance data maintained therein, wherein said performance data contains performance characteristics (torque, for example) of said mechanical system; recovery mechanism (microcontroller 6) for recovering said performance data; reflecting mechanism for reflecting a portion of said light through said encoded portion of said rotating member; wherein said encoded portion of said rotating member comprises a bar code (the bands 2 and 3 have regions of high and low reflectivity, and thus, can be considered a bar code) (see figures 1, 2, 4, column 1 line 50 - column 2 line 15, column 2 lines 40-58, and column 3 lines 20-64).

Bechtel et al fails to specifically teach the light source comprising two vertical cavity surface-emitting lasers.

The teachings of Cui et al have been discussed above.

In view of Cui et al's teachings, it would have been obvious to one of ordinary skill in the art at the time of the invention to include, with the apparatus as taught by Bechtel et al, the light source comprising two vertical cavity surface-emitting lasers, in order to provide a compact laser diode for the light source, thereby reducing the size of the apparatus.

***Allowable Subject Matter***

6. Claims 17-19 and 21-32 have been allowed over the prior art of record.
7. The following is an examiner's statement of reasons for allowance: The prior art of record, taken alone or in combination, fails to teach or fairly suggest: an apparatus for detecting the relative motion between two rotating members in a mechanical system, comprising two identical lasers for generating two identical light beams and a detector that detects Moire fringes formed as a result of interaction of images from reflection the first and second light beams from first and second reflectors, respectively mounted on first and second rotating members, in combination with the other claimed limitations as set forth in claim 17.

While Desson et al teaches an apparatus for detecting relative motion, including two identical lasers (353 and 354, figure 6), Desson et al fails to specifically teach detecting relative motion between two rotating members. Furthermore, Desson et al uses two lasers when measuring distortion in the X and Y directions (see column 7 line 57 - column 8 line 4), only a single laser is necessary for measuring distortion in a single direction. Thus, without the benefit of applicant's teachings, there is no motivation for

one of ordinary skill in the art at the time of the invention to combine Desson et al with the prior art of record in a manner so as to create the claimed invention.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

8. Applicant's arguments filed 10/20/2003 have been fully considered but they are not persuasive.

In response to applicant's argument that neither Cui et al does not teach the benefits of utilizing VCSEL technology for the detection of Moirè fringes in their system (see page 13 of the amendment filed on 10/20/2003), Cui et al teaches the use of a VCSEL to detect movement in a mechanical system. Cui et al also mentions that the use of a VCSEL provides a compact laser diode module (see column 7 lines 31-37). Thus, one of ordinary skill in the art at the time of the invention would have been motivated to combine the VCSEL, as taught by Cui et al, with the apparatus and method, as taught by Burke, Jr, in order to provide a compact light source, thereby allowing reduction in the size of the apparatus. Thus, the combination of Burke, Jr and Cui et al meet the claimed invention.

In response to applicant's argument that neither Bechtel et al or Cui et al, alone or in combination teach the use of two VCSELS to reflect off of two separate patterns borne by two rotating members associated with a torsion bar (see page 14 of the

amendment filed on 10/20/2003), Bechtel et al teaches the use of two lasers (there are two lasers 18, since each sensor head 4 and 5 contains a laser 18) to reflect off of two separate patterns (the patterns of different portions of reflectivity) born by two rotating members (bands 2 and 3) associated with a torsion bar (shaft 1). Cui et al teaches the use of a VCSEL to detect movement in a mechanical system. Cui et al also mentions that the use of a VCSEL provides a compact laser diode module (see column 7 lines 31-37). Thus, one of ordinary skill in the art at the time of the invention would have been motivated to combine the VCSEL, as taught by Cui et al, with the apparatus, as taught by Bechtel et al, in order to provide a compact light source, thereby allowing reduction in the size of the apparatus. Thus, the combination of Bechtel et al and Cui et al meet the claimed invention.

### ***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Chen (US 2003/0138020 A1), Shiba (US 2003/0218126 A1), Heisenberg et al (US 2003/0145663 A1), Harriman et al (US 6,666,375 B1), Yamamoto et al (US 6,639,207 B2), Nihommori et al (US 6,635,863 B1), Bartzke et al (US 6,586,719 B1), Kuroda et al (US 6,460,422 B1), Walker et al (US 5,253,531), Schneider et al (US 5,038,616), and Desson et al (US 4,850,693) all teach methods and apparatus for measuring movement in a mechanical system.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jared J. Fureman whose telephone number is (571) 272-2391. The examiner can normally be reached on 7:00 am - 4:30 PM M-T, and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Lee can be reached on (571) 272-2398. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

January 11, 2004

*Jared J. Fureman*  
Jared J. Fureman  
Art Unit 2876